Space Weather Forecast

Issued on Saturday, 17 August 2024 at 13:05 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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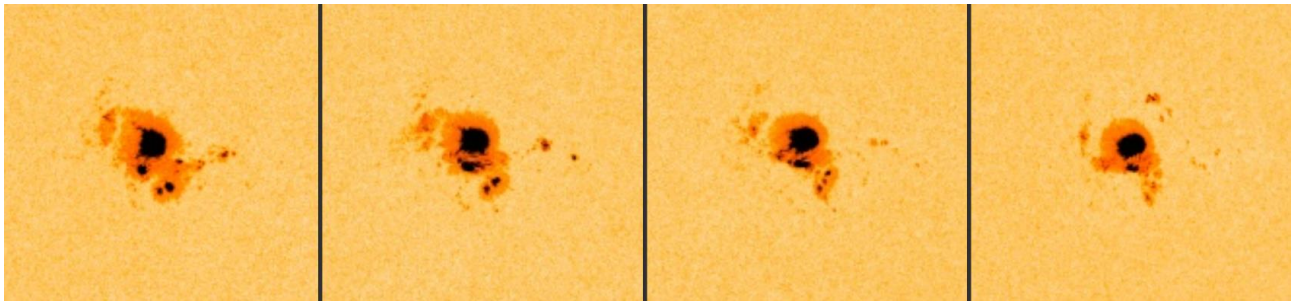
Space Weather Forecast Headline: Minor/Moderate geomagnetic storm (G1/G2) likely UTC day of Saturday 17 August. New CME from northwest, imagery awaited.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity rose to Moderate in the past 24 hours, with a low-end Moderate-class X-ray flare observed from a departing sunspot on the southwestern solar horizon at 16/1324UTC. This was later trumped by a similarly-sized flare from the most complex region at 17/1033UTC. This second event is considered likely to have produced a Coronal Mass Ejection (CME). Imagery is awaited. A third sunspot region also produced a late Moderate class flare at 17/1143UTC.

There are now up to 12 sunspot regions on the facing side of the Sun, with the aforementioned large sunspot group no longer visible on the southwest of the Sun, while a small magnetically 'unipolar' spot also faded in the northwest. In the northeast, up to two new minor regions developed in the period. The two largest remaining groups both showed development and growth of their leading spots in the period, while a further two in the centre-west showed more marked proliferation of spots generally, but both from a lower base complexity. Probably the most nominally potent group on the disc remains one in the northwest (responsible for the inbound CME and Strong class flare of 14 August). Its span has reduced compared with recent analyses, but its risk of flaring is felt to remain similar.

Figure 1: Visible satellite imagery sequence of (perhaps) the most complex sunspot region on the Sun at 00UTC each day from 14 to 17 August inclusive (left to right). The first image immediately precedes the Strong-class X-ray flare. Areal decrease, a tendency towards greater symmetry and a reduction in the number and intensity of surrounding spots have all taken place, but the inherent instability remains.



There were numerous minor 'filament lift-offs' (arcs of plasma leaving the Sun) identified in the past 24 hours - either from high latitudes or sufficiently far west to not have Earth-directed components. Modelling for a minor event from the vicinity of the most complex sunspot group at 17/0500UTC is awaited. No new CMEs were therefore in evidence, although note that imagery is awaited for the Moderate-class flare associated event from the large sunspot group in the northwest.

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Solar Wind / Geomagnetic Activity: Solar winds were reflective of a slow regime. There are some signs on near-Earth satellites of a very gradual uptick in some particles (sometimes a precursor to CMEs), however the Strong-class CME of 14 August is still awaited.

The solar wind speed showed a slight dip within background levels, as did the number of particles in the solar wind. The magnetic field was stable, with no strongly aligned or anti-aligned periods with Earth's field. The net result of the above solar wind measures was for provisionally quiet geomagnetic indices throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were identified.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is expected, with a daily slight chance of isolated Strong-class flares, perhaps most likely from the large sunspot region in the northwest. This risk is judged constant throughout, with significant departing regions perhaps in some way compensated for by the weight of numbers of eastern solar horizon arrivals.

Solar Wind /Geomagnetic Activity: A faint CME occurred due to the Strong-class flare at 14/0640UTC. This is now slightly overdue (but still within the stated margin of error) and is forecast to arrive within the remainder of day 1 (Saturday 17 August). The strength of this is low confidence, with the main geomagnetic activity likely to develop in the hours following the initial arrival. This has the potential to be further enhanced by a fast solar wind, however in itself this fast wind is most likely to pass over the Earth to little or no effect.

Mainly quiet geomagnetic activity is therefore expected at first, giving way to likely G1/G2 Minor to Moderate Storm on day 1 (Saturday 17 August) due to the CME arrival. There is now a decreased slight chance of this event reaching G3 Strong (Kp 7) Storm. Activity should then revert to quiet later on day 2 (Sunday 18 August).

Energetic Particles / Solar Radiation: High energy proton flux is most likely to remain at background, but with a slight chance of breaching S1 Minor solar radiation storm level should any notable flares occur from either the large sunspot group on the southwestern solar horizon or the large remaining region in the northwest.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	50	1	1
Strong	G3	No	10	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	80	80	80	80
Very Active	R3 to R5 X	No	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	5	5	5	5
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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